Introduction to Automatic Identification Technology (AIT)

Mr. Ed Chergoski
Readiness Branch Manager
NAVSEA 04L52
Chergoskiej@navsea.navy.mi
l
(202) 781-3302

1

Presentation Outline

- **DoD & Commercial Defined AIT**
- **Data Accuracy**
- **AIT Technologies:**
    - Bar Codes
    - Contact Memory Buttons (CMB)
    - Smart Cards
    - Radio Frequency Identification (RFID)
    - Radio Frequency Data Communication (RFDC)
- **VADM Nanos'Message**
- **AIT Challenges**
- **AIT Goals**
- **DoD Objectives**
- **NAVSEA AIT Steering Committee**
- **NAVSEA AIT Projects:**
    - Smart Stores Tracking & Handling
    - Smart Store Room
    - White House Communications Agency (WHCA)
- **Sources & Links**

DOD AIT Defined

Automatic Identification Technology, the DOD Perspective

" AIT is a suite of technologies that enable the automatic capture of source data, thereby enhancing the ability to identify, track, document and control deploying and redeploying forces, equipment, personnel and sustainment cargo."

DOD Logistics AIT CONOPS – November 1997

3

Commercial AIT Defined

Automatic Data Collection, the Commercial Perspective

"ADC technology is any technology which allows us to enter information into a computer system totally without, or with a minimum of, manual key entry." Thus, the primary benefit of integrating ADC (or AIT) is the significant reduction of time-consuming, error-prone, manual entry of data into a computer."

The Association of ID Manufacturers (AIM)

AIT Increases Data Accuracy

Error Rate per Keystroke is Approximately 1 in every 80

ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQR1TUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
AB2DEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRS3UVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEF4HIJKLMNOPQRSTUVWXYZ

Barcodes

Barcodes are an Efficient Method to Gather Input for Database Manipulation

- **Uses:**
  - Inventory Control
  - Document Tracking
  - Security Screening
  - Automation Controls
  - Timecard Recording
  - Property Accountability
  - Point-of-sale Transactions
  - Work-in-process Monitoring

- **Barcode Limitations:**
  - Read Only Forces Label Changes
  - Environmental Effects (sun, UV, rain, etc.)
  - Close Range Access
  - Reduced Opportunity for Multiple Uses

- **Barcode Advantages:**
  - Low cost start-up
  - Proven technology with standards

6

Linear Barcodes

8137919805

- **Overview:**

  – Inexpensive, Low Error Rate, Disposable, Industry Standard

  – 17-20 Character Capacity

  – Printer Encoding

  – Hand Held Access

  – Close Range Access

- **Advances:**

  – Label materials

  – Adhesives

  – Commercial Standards

  – Integrated Terminals

- **Cost:**

  – Pennies per Label

Two Dimensional (2D) Barcodes

- **Overview:**

  - Inexpensive, Higher Capacity

  - 1,850- 2000 Character Capacity

  - Printer Encoding

  - Hand Held Access

  - Close Range Access

PDF 417

- **Advances:**

  - Printer and Scanners

  - Commercial Standards

  - Several Types

- **Cost:**

  - Pennies per Label

8

Contact Memory Button (CMB)

- **Capacity:**
  - Up to 2 meg
- **Durability:**
  - Hermetically Sealed, Various Casing Options Survives Almost All Forms of Environmental Exposure (including X-ray and EMI)
- **Characteristics:**
  - As small as 5mmx2mm Foot Print, Numerous Mounting Techniques, No Batteries
- **Applications:**
  - Asset Management, Production/Life Cycle, Maintenance Data, Electronic Logs/Records, Remote Data Access, and Limited Hardware Accessibility Applications
- **Read/Write:**
  - Handheld Computer or RS232 Devices

9

CMB Versatility

Waterproof, Non-Corrosive, and Very Robust…

- **Features:**
  - Temperature Extremes of -85° to +450
  - Humidity 5 to 95% Non-condensing
  - Radiation (X, G, and UV) 100,000 Rads
  - Atmospheric Environmental Tests
  - Electromagnetic Pulse — 5.8, 26.7, and 55kV/m
  - Vibration (600 hours on helicopter blades and gearbox)
  - 100 Year Data Retention
- **Buttons Limitations:**
  - Costly ($14-$16 ea)
  - Requires actual contact with button
  - Requires careful placement of button on object

Smart Cards

- **Overview:**
  - Credit Card Size
  - Integrated microprocessor (computer)
  - Storage up to 16,000 Bytes
  - Multi-Level Security
  - Capable of storing Biometrics Pattern

- **Advances:**
  - Larger memory size
  - SCTO establishing DoD Standard
  - Integrated Readers
  - Open Architecture
 - Multiple applications on a single card

Radio Frequency Identification (RFID)

- **Application:**
  - Repair Parts or Equipment
  - Pallets or Cases of Product
  - Vehicles
  - Company Assets or Personnel
  - Apparel, Luggage and Laundry
  - People, Livestock or Pets
  - Test Equipment, Computers and High Value Items

- **RF Limitations:**
  - Electromagnetic interference (both directions)
  - Host Nation Approval Process
  - Leading technology (not standardized)
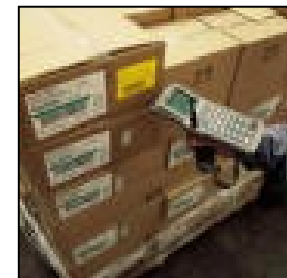
Radio Frequency Data Communication (RFDC)

Reduces Support Infrastructure - Puts Information Where it's Needed

- **Standards:**
  - No DOD Standards
  - Mainly Manufacturers Proprietary Systems/Protocols

- **Range:**
  - Dependant on Type System Usually 500 Feet or More
  - Used Predominately in Retail and Warehouse Systems

- **Characteristics:**
  - Combines the Features of a Handheld Data Computer and a Two Way Radio.
  - Communicates with Host Computer via RF Network
  - Addresses Cabling Concerns
  - Is Number One Reason for System Downtime

VADM Nanos' Message to the Fleet
&
Contractors that Support Naval Vessels

"We will all have to adapt to using the ERP model."

"Ultimately everyone that touches a gray ship or submarine will be part of this ERP. As we go down this path of having more and more commercial involvement in fleet support, you still want to have this unified database and you won't want to set up separate databases that we would have to integrate."

AIT Challenge

- AIT usage is proliferating rapidly with over 40 initiatives in program Navy-wide.

- Currently within NAVSEASYSCOM, there is no coordinated program to insure AIT is adopted and deployed in a manner that adequately facilitates interoperability between systems and compliance with DoD and Navy AIT Directives for use of standard data elements, semantics and syntax.

- In order to have fully effective logistics functionality within Enterprise Resource Planning (the necessary volume of timely, accurate and complete source data), AIT must be fully exploited and implemented in conjunction with SAP. (ERP = SAP + AIT)

15

AIT Goals

- ## Department of Defense

    "The proper mix of technologies that allows users to efficiently and effectively capture, aggregate, and transfer data and information, and integrate with logistics AISs, using the optimum technology for their particular application. AIT will facilitate data collection and flow to all AISs to better achieve full Total Asset Visibility, enhance and streamline business processes and warfighting capability."

- ## Navy AIT Program Office

    "Deliver AIT applications which provide accurate, timely and usable information for Total Asset Visibility through the most efficient use of AIT to continuously improve Navy-wide logistics processes, enhance operating force readiness, and reduce the cost of logistics."

NAVSEA AIT Steering Group

- AIT Steering Group established 11/01 with OPNAV N413 concurrence
- Charter for AIT Steering Group ratified by voting members 12/01
  - Charter approval expected by 3/02
- AIT Steering Group Consists of:
  - A matrix-organized body of experts representing logistics functional, technical and acquisition communities within greater NAVSEASYSCOM organizational structure, including direct reporting PEOs and PMs, and selected engineering field activities.
- Steering Group Meeting Schedule
  - 03 Dec 01 (Complete)
  - 09 Jan 02 (Complete)
  - 23 April 02

Charge to the AIT Steering Group

Goals

Deliver benefits of AIT to the NAVSEA Community

Exploit the opportunities presented by other DoD AIT initiatives

Keys to Success

Promote Common Vision & Perspective

Share information

Leverage efforts

Track technology developments

Build on good work already done

Facilitate "issue" resolution

NAVSEA AIT Steering Committee

The NAVSEA AIT Steering Committee encourages the use of AIT throughout the Fleet

- **Established Three Working Groups:**
  - Maintenance/Logistics
    - Chair: NSWC, Indian Head
  - Information Systems and Security
    - Chair: NSWC, Indian Head
  - Technology:
    - Chair: Navy AIT Support Facility
- **Established two ad hoc working groups**
  - Shipyard implementation
  - Instructions
- **Draft SECNAV/OPNAV Instructions**

AIT PROJECTS

Smart Stores Tracking & Handling

NAVSEA — NAVAL SEA SYSTEMS COMMAND

Goal: Integrate AIT (RFDC & RFID) into afloat supply processes to reduce workload afloat and improve inventory accuracy

Smart Stores Objectives:

- Transition NAVSUP Smart Storeroom Concept Exploration
  and Demonstrations to a NAVSEA/NAVSUP Smart Stores
  Tracking & Handling Integration and implementation Effort
- Automate the receipt, inventory, issue processes
- Reduce/eliminate manual inventories
- Use RFID technology to track DLRs and high cost DLA items
  to maintain accurate onboard inventory
- Fully integrate with Shipboard AIS
- Integrate with Automated Material Handling Systems

Status:

- Smart Storeroom Concept Demonstration on the USS
- NORMANDY (CG 60) – Success!
- 2Smart Storeroom Final Report - Complete
- Smart Stores Draft Work Breakdown Structure

Time Line

Smart Storeroom Concept Exploration and Demonstrations (FY99 -01)

Smart Stores Advanced Development & Integration (FY 02 – 03)

Smart Stores Ship Installations (FY 04 - 07)

LCM of Smart Stores Systems (FY 07 - XX)

1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

Smart Stores Tracking & Handling

Proposed Work Breakdown Structure

1.0 Hardware
- 1.1 RFDC/RFID
- 1.2 Networking (Wired and Wireless)
- 1.2 Storeroom
- 1.3 Conveyance (Automatic Loader/Unloader (Safety)

2.0 Software
- 2.1 Integrated Barcode System (IBS) (Modify Issues/Full Deployment)
- 2.2 Relational Supply (Force/Unit R-Supply)
- 2.3 Enterprise Resource Planning (ERP) or Bolt-On

3.0 Design/Integration
- 3.1 Work Flow Processes
- 3.2 Publications
- 3.3 Certifications/MOA's (HERO, ISNS, Host Nation, Joint Frequency Spectrum)

4.0 Prototype
- 4.1 Ship
- 4.2 Length

5.0 Installation

5.1 Priority and Schedule

5.2 JCF/CCB/SAR

5.3 Part Marking/Shipping and Labeling

6.0 Funding

6.1 Current (NAVSUP)

6.2 Long Term (Sweep Up and POM)

7.0 Shore Infrastructure

8.0 Program Management

8.1 Lead - NAVSEA AIT Steering Group

8.2 Supporting Commands – NAVSUP, NSWCIH, NAWC, NSWCCD SSES, SPAWAR

Smart Stores Tracking & Handling

Total Asset Visibility

- **Problem : Current Inventory Practices are labor intensive**
  - **Increased inaccuracy**
  - **Increased Ship Weight**
  - **Increased Manning**
  - **Increased Material Surplus**
  - **Decreased Operational Readiness**
  - **Decreased Quality of life for Sailor**

- **AIT and WLAN**
  - **RFID and RFDC enable total asset visibility**
  - **WLAN enables portability both within ship and ship-to-shore**

- **Demonstrations and Progress**
  - **Phase I and II demonstrations complete**
    - **RFID and RFDC proven in afloat environment**
  - **Phase I Complete**
    - **Environmental T&E**
  - **Phase II Complete**
    - **Hardware recommendations**
    - **Business practice recommendations**

- **Return on Investment**
  - **Increased Fleet/Battlegroup operational readiness**
  - **Reduced workload**
  - **Proactive maintenance and supply**
  - **(Just-in-Time rather than Just-in Case)**
  - **Reduced material surplus and ship weight**
  - **Decreased Logistic Support cost**
  - **Reduced Total Ownership cost**
  - **Increased quality of life for the sailor**

23

Return on Investment (ROI) Man Hour Reduction

- **Receipts:** Data Entry: 260-433 manhours/year
- **Issues:** Data Entry: 260-433 manhours/year
- **Stows:** Data Entry: 433 manhours/year
- **Inventories:** Data Entry: 333 manhours/year-Non-DLR

  Data Entry: 65 manhours/year-DLR

- **DLR SK:** Labor: 1161 manhours/year (1/3 Manyear)

- **Workload Savings Estimates:**
  - CG (5200 receipts/year): .72 - .82 manyear
  - DOD Composite Rate for E5: $22.44/hr
  - Afloat Manyear: 3484 manhours - $78,181.00
  - Estimated dollar savings: $56,290 - $64,108/year

24

Smart Stores
Total Asset Visibility

PMS 317/470 New Proposal

Evolutionary approach which utilizes CMB connected via RFDC to shipboard and/or a test shore-based AIS (today)

- Project unique because it tackles legacy system issues
- Project promises the ability to expand the use of AIT into other configuration management processes and other logistics disciplines later, e.g., maintenance, transportation and inventory control

– Project fosters the insertion of other AIT

PHASE I KEY EVENTS

- Define new wireless Configuration Management process
- Select ship platform
- Select shipboard systems/equipment
- Perform site survey
- Select AIT media
- Identify key data elements to be on AIT media (to include multiple support requirements)
- Develop software interfaces and routines

PHASE II KEY EVENTS

- Develop test database

- Comply with regulations governing wireless operations

- Conformance with applicable DoD, Navy and commercial standards

- Procure shipboard AIT equipment and conduct training

- Populate & mark selected systems

- Test AIT media afloat and ashore

- Produce documentation (all types)

- Final analysis and report

EXPECTED BENEFITS

- Across-the-board improvement of configuration validation process:
  - Improved configuration data management
  - Improved availability/accessibility of logistics support products
  - Significantly improved quality of configuration validations
  - Establish CM baselines for RMA data collection and knowledge sharing
  - Moves work off-ship outside ship availability period
  - CMBs reduce time/cost required for future equipment/system validations
  - Project will encourage expanded WLAN usage on future ship designs and will promotes AIT use in maintenance

White House Communications Agency (WHCA) AIT Project

Provide a premier communications system that enables the President to lead the nation

- **Objective:**
  - Provide an AIT-enabled system for the inventory management of GPETE that also provides an on screen signature capture functionality
- **Goals:**
  - Automate Asset Tracking / Reduce Manual Tracking
  - Automate Issue / Receipt Process at Trip Site
  - Capture Signature of Person to Whom Assets Are Issued
  - Improve Inventory Control / Accountability
- **Status:**
  - Software Development complete
  - Currently Performing Test and Evaluation
  - Installation in March 2002

29

Functional Overview of the WHCA AIT System

- Track packages, boxes and assets at WHCA headquarters and during deployment
- Store and change location, trip and status of assets and packages
- Issue and receive assets using signature capture
- Inventory a group of assets and print reports by status, location and equipment type
- Print barcodes
- Functions are achieved using linear barcodes and signature capture capability

8137919805

30
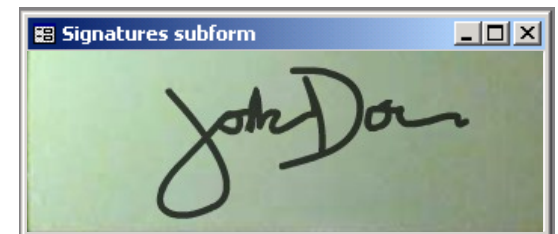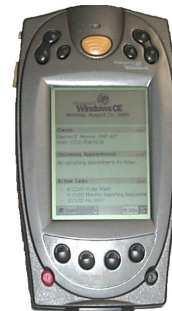
Sources and Links

- **DOD:**
  - Navy AIT Website: http://www.navy-ait.com
  - Navy AIT Support Facility: (301)995-8225
  - DLA: http://dodait.com
  - Army AIT Coordinating Group: http://lia.army.mil/exe/ait
  - Army Maintenance AIT: http://armymaintenanceait.org
  - Air Force: http://www.afmc.af.mil/
  - Marine Corps: http://marcorsyscom.usmc.mil/ait

- **Commercial:**
  - Automatic Identification Manufactures: http://www.aimglobal.org
  - MacSema Corporation: http://www.macsema.com